

2012 MCAS Exam Test Items

- Test item alignment to
Energy 1: Integrating Sciences through Energy
Questions 6, 7, & 11 directly align.

XVI. Science and Technology/Engineering, Grade 5

Grade 5 Science and Technology/Engineering Test

The spring 2012 grade 5 Science and Technology/Engineering test was based on learning standards in the four major content strands in the Massachusetts *Science and Technology/Engineering Curriculum Framework* (2006) listed below. Page numbers for the grades 3–5 learning standards appear in parentheses.

- Earth and Space Science (*Framework*, pages 26–29)
- Life Science (Biology) (*Framework*, pages 46–49)
- Physical Sciences (Chemistry and Physics) (*Framework*, pages 64–66)
- Technology/Engineering (*Framework*, page 86)

The *Science and Technology/Engineering Curriculum Framework* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

Science and Technology/Engineering test results are reported under four MCAS reporting categories, which are identical to the four framework content strands listed above.

Test Sessions

The grade 5 Science and Technology/Engineering test included two separate test sessions. Each session included multiple-choice and open-response questions. Approximately half of the common test items are shown on the following pages as they appeared in test booklets.

Reference Materials and Tools

The use of bilingual word-to-word dictionaries was allowed for current and former English language learner students only, during both Science and Technology/Engineering test sessions. No other reference tools or materials were allowed.

Cross-Reference Information

The tables at the conclusion of this chapter indicate each released and unreleased common item's reporting category and the framework learning standard it assesses. The correct answers for released multiple-choice questions are also displayed in the released item table.

Science and Technology/Engineering

SESSION 1

DIRECTIONS

This session contains six multiple-choice questions and one open-response question. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 1 Which of the following is a reason loggerhead turtles bury their eggs in holes that they dig on the beach?
- A. to keep the eggs covered with water
 - B. to provide the eggs with nutrients
 - C. to hide the eggs from predators
 - D. to protect the eggs from sand

- 2 The picture below shows a balloon filled with air.



A teacher carefully pops the balloon with a pin. The students pick up the pieces of the balloon and compare them.

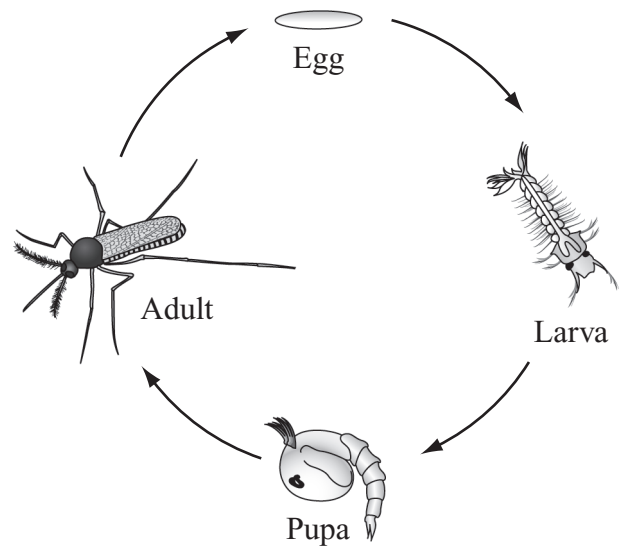
Which of the following properties of the pieces should be **most** similar?

- A. color
- B. shape
- C. size
- D. weight

3 Which of the following statements **best** describes a complex machine?

- A. It is designed to move with a motor.
- B. It is constructed from machine-made parts.
- C. It is made of more than one simple machine.
- D. It is built from more than one type of material.

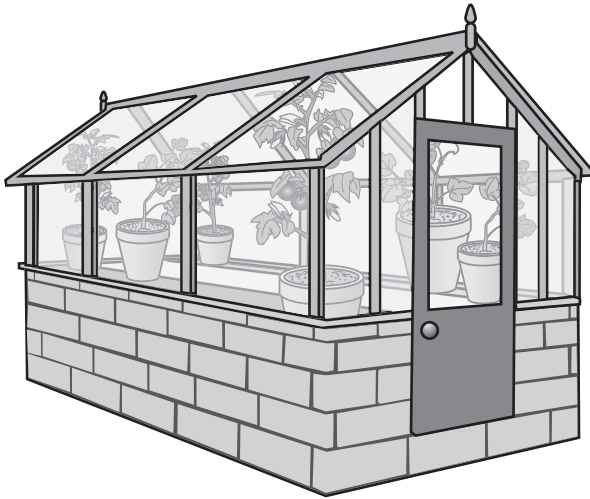
4 The diagram below shows four stages in the life cycle of the mosquito.



During which stage in its life cycle is the mosquito able to mate and reproduce?

- A. egg
- B. larva
- C. pupa
- D. adult

- 5 Carlos and his grandfather grow plants all year long in a greenhouse in Boston, Massachusetts. The picture below shows the greenhouse where they grow their plants.



This greenhouse was **most likely** built to solve which of the following problems?

- A. How do they put fertilizer in the soil?
- B. How do they give water to the plants?
- C. How do they protect the plants from weather conditions?
- D. How do they store the garden tools in an organized way?

- 6 Which of the following processes makes it possible for plants to use energy from sunlight to produce their own food?

- A. metamorphosis
- B. photosynthesis
- C. pollination
- D. reproduction

Question 7 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 7 in the space provided in your Student Answer Booklet.

7

The picture below shows a battery-powered electric car. The chemical energy in the battery is changed into electrical energy when the car is being driven. The electrical energy is then changed into other forms of energy in the car.



- Identify **three** parts of the car that use electrical energy.
- Describe how electrical energy changes into another form of energy in **each** part of the car you identified in part (a).

Science and Technology/Engineering

SESSION 2

DIRECTIONS

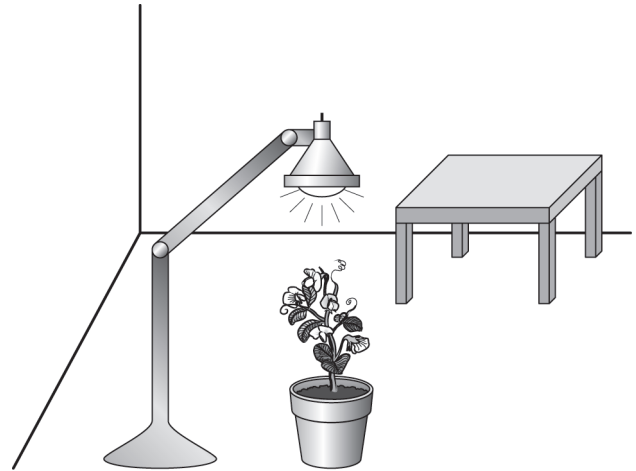
This session contains thirteen multiple-choice questions and one open-response question. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 8 Cameron is shopping for a new desk. He wants to make sure the desk will fit in the corner of his room.

When Cameron shops for the new desk, which of the following will **best** help him make sure that the desk will fit?

- A. a picture showing the carpet in his room
- B. a diagram of the measurements of his room
- C. a drawing showing how to put a desk together
- D. a list of tools he needs to put the desk together

- 9 The picture below shows a plant growing in a closed room under a single light.



The plant is moved to the table in the back of the room and the light remains in the same place. Which of the following will change the **most**?

- A. the direction the plant grows
- B. the nutrients the plant needs
- C. the shape of the plant's leaves
- D. the color of the plant's flowers

- 10 The table below lists some weather conditions for one day in Worcester, Massachusetts.

Wind Speed	1–2 mi. per hr
Wind Direction	north
High Temperature	82°F
Precipitation	1.0 in.

Based on the information in the table, which of the following types of precipitation **most likely** occurred on this day?

- A. hail
- B. rain
- C. sleet
- D. snow

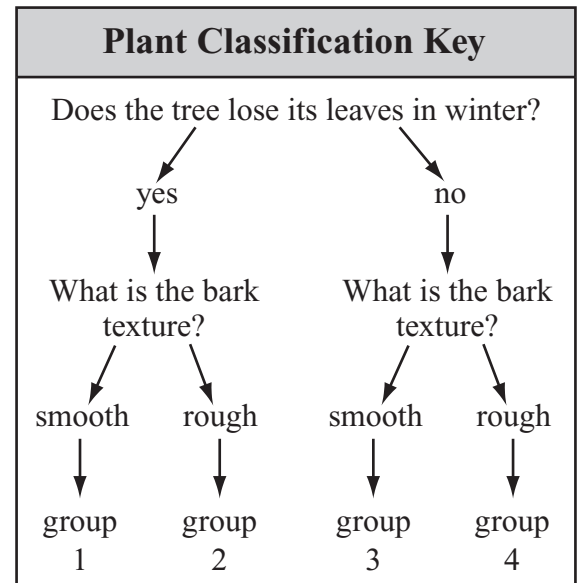
- 11 Which part of a plant is **most** responsible for using energy from the Sun to produce food for the plant?

- A. flower
- B. leaf
- C. root
- D. stem

- 12 Which of the following characteristics is a lion **least likely** to pass on to its offspring?

A. colors of its fur
B. length of its tail
C. scars on its leg
D. size of its body

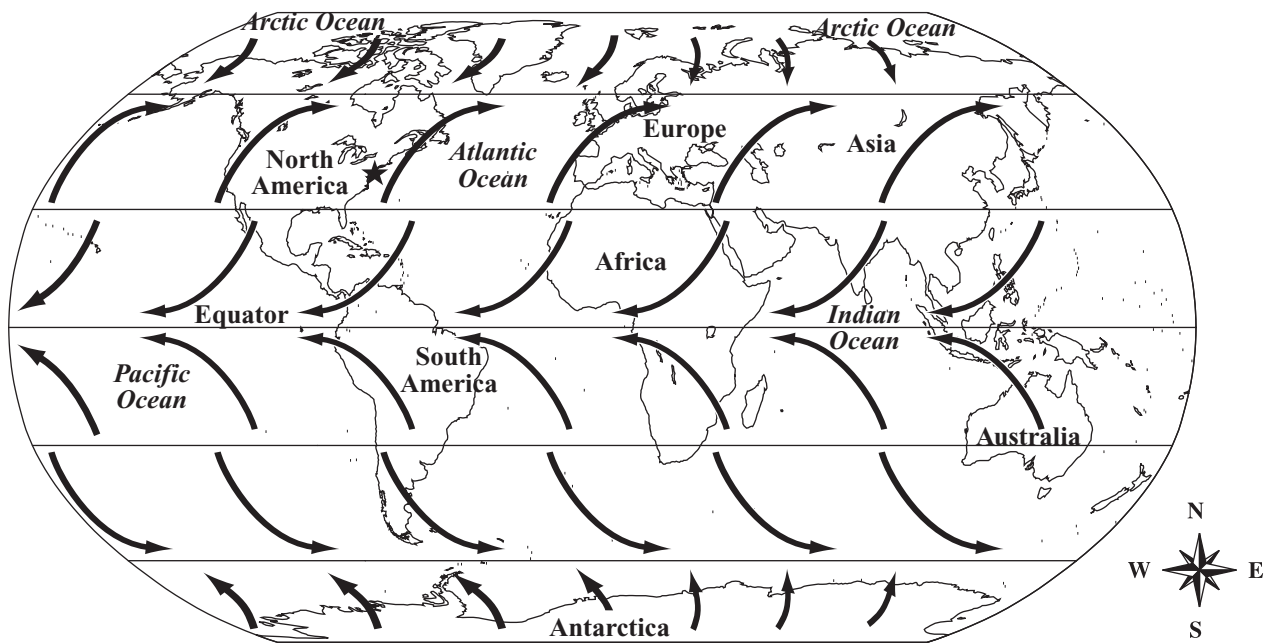
- 13 Kate is using the key shown below to classify a tree into one of four different groups.



The tree loses its leaves in winter and has rough bark. According to the key, into which group should the tree be classified?

- A. group 1
B. group 2
C. group 3
D. group 4

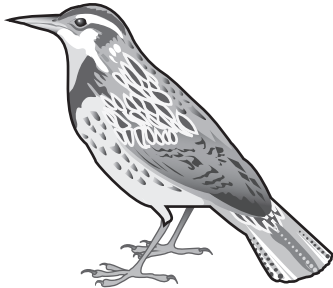
- 14 The map below shows global wind patterns. The east coast of the United States is marked with a star.



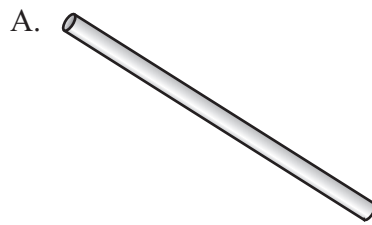
Global winds blow in the directions shown on the map. Winds blowing from the east coast of the United States have the **most** effect on the weather in which of the following regions?

- A. Africa
- B. Asia
- C. Europe
- D. South America

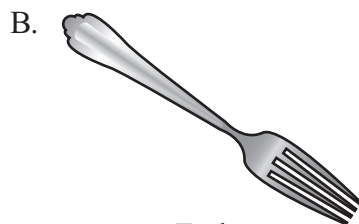
- 15 Eastern meadowlarks are birds that use their beaks to grab and remove insects from holes in trees. An eastern meadowlark is shown below.



Which of the following objects functions **most** like the meadowlark's beak?



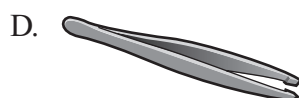
Drinking straw



Fork



Scissors



Tweezers

- 16 The picture below shows a drum.

Drum head



What could be done to the drum head to make the drum have a higher pitch?

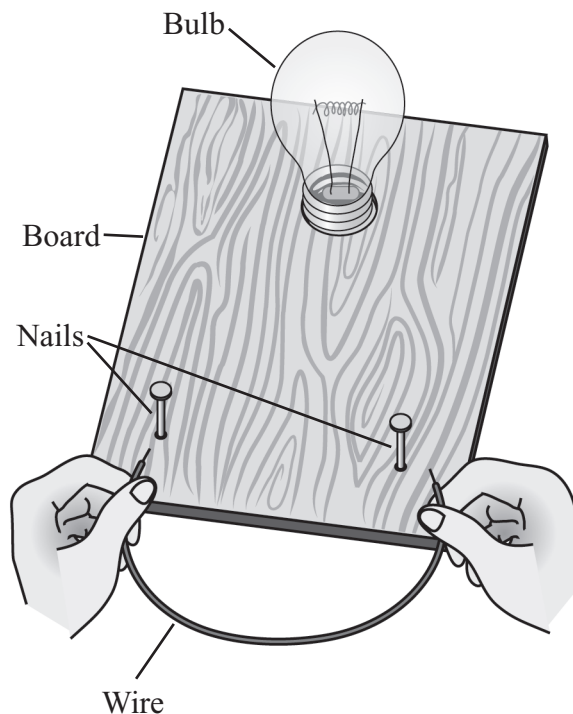
- A. Cover the drum head with a piece of plastic.
- B. Put a thicker drum head on the drum.
- C. Hit the drum head with more force.
- D. Tighten the drum head.

- 17 In some locations, squirrels sleep for long periods of time during the winter months. Which of the following **most likely** causes these squirrels to sleep for long periods of time?
- A. increase in humidity
 - B. decrease in temperature
 - C. clouds forming in the sky
 - D. winds blowing in the night
- 18 The Sun appears to move across the sky each day, rising in the east and setting in the west. What causes this apparent motion?
- A. the rotation of Earth on its axis
 - B. the revolution of the Sun around Earth
 - C. the Earth's distance from the Sun
 - D. the properties of Earth's atmosphere

- 19 A student observed a rock made up of many small particles of sand arranged in light-colored layers and dark-colored layers. Which of the following statements describes how this type of rock **most likely** formed?

A. Clay was crushed and frozen under a glacier.
B. Lava from a volcano cooled quickly in water.
C. River sediments were slowly compacted and cemented together.
D. Mineral deposits hardened into solid rock in underground caves.

- 20 The diagram below shows a project that a student made to test an electrical circuit. Part of the electrical circuit is underneath the board.



When the student connects the two nails using a wire, the bulb lights up. Which of the following **must** be underneath the board?

A. a magnet and a switch
B. a switch and some wires
C. a magnet and a power source
D. a power source and some wires

Question 21 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 21 in the space provided in your Student Answer Booklet.

- 21** Alicia lives near the beach. She wants to plant a vegetable garden, but she knows vegetables will be difficult to grow in the sandy soil in her backyard.
- Describe **two** properties of sandy soil that make growing vegetables difficult.
 - Describe **one** thing Alicia could add to the soil to make it better for growing vegetables. Explain the reasoning for your answer.

Grade 5 Science and Technology/Engineering
Spring 2012 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC)*
1	270	<i>Life Science</i>	10	C
2	270	<i>Physical Sciences</i>	1	A
3	271	<i>Technology/Engineering</i>	1.3	C
4	271	<i>Life Science</i>	3	D
5	272	<i>Technology/Engineering</i>	2.1	C
6	272	<i>Life Science</i>	11	B
7	273	<i>Physical Sciences</i>	5	
8	274	<i>Technology/Engineering</i>	2.2	B
9	274	<i>Life Science</i>	9	A
10	275	<i>Earth and Space Science</i>	7	B
11	275	<i>Life Science</i>	2	B
12	276	<i>Life Science</i>	5	C
13	276	<i>Life Science</i>	1	B
14	277	<i>Earth and Space Science</i>	8	C
15	278	<i>Technology/Engineering</i>	2.4	D
16	278	<i>Physical Sciences</i>	11	D
17	279	<i>Life Science</i>	8	B
18	279	<i>Earth and Space Science</i>	14	A
19	280	<i>Earth and Space Science</i>	3	C
20	280	<i>Physical Sciences</i>	6	D
21	281	<i>Earth and Space Science</i>	5	

* Answers are provided here for multiple-choice items only. Sample responses and scoring guidelines for open-response items, which are indicated by shaded cells, will be posted to the Department's website later this year.

**Grade 5 Science and Technology/Engineering
Spring 2012 Unreleased Common Items:
Reporting Categories and Standards**

Item No.	Reporting Category	Standard
22	<i>Life Science</i>	6
23	<i>Earth and Space Science</i>	4
24	<i>Earth and Space Science</i>	12
25	<i>Earth and Space Science</i>	11
26	<i>Life Science</i>	1
27	<i>Earth and Space Science</i>	15
28	<i>Physical Sciences</i>	8
29	<i>Life Science</i>	3
30	<i>Physical Sciences</i>	7
31	<i>Earth and Space Science</i>	4
32	<i>Earth and Space Science</i>	10
33	<i>Life Science</i>	7
34	<i>Physical Sciences</i>	4
35	<i>Physical Sciences</i>	2
36	<i>Earth and Space Science</i>	1
37	<i>Physical Sciences</i>	9
38	<i>Physical Sciences</i>	12
39	<i>Earth and Space Science</i>	9
40	<i>Life Science</i>	9
41	<i>Physical Sciences</i>	3
42	<i>Technology/Engineering</i>	2.1